of the book consists of descriptions of many specific human traits, including differences classed as beneficial, deleterious, and neutral in their effects. The treatment of psychological characteristics, including mental diseases, has been extended. The last 150 pages contain chapters on evolution, human races, eugenics, and related problems, and a list of references and an index.

The author evidently has had a remarkably broad and fruitful acquaintance with professional geneticists and medical men, from whom he received much advice and assistance. Individual credit is given to one or more such persons for critically reading most of the chapters. In general the writing shows that care was taken to inform the reader whether statements are to be taken as established facts, as generally accepted theories, or as speculations. The reviewer has noted very few statements that seem to be factual errors or debatable propositions set forth as facts. In a book of such size and range some of these are to be expected.

Contemporary workers on the problem of gene duplication may question the assertion on page 59 that genes reproduce "by dividing and forming two of themselves." So far as the reviewer is aware, the precise method of gene duplication is unknown. On page 126 there is an apparent slip in using the expression "pigmy Hottentots." Although of small stature, the Hottentots are not commonly classed as Pygmies. On page 194 it is stated that Pygmies are found in Africa and Australia and that some tribes of Pygmies are achondroplastic dwarfs. The presence of Pygmies in the Andaman Islands, the Malay Peninsula, New Guinea, and the Philippines is not mentioned. True Pygmies seem not to have been reported from Australia. Published studies of Pygmies indicate that they are not achondroplastic dwarfs, in the usual sense of the term, either morphologically or genetically.

The criticisms are of minor importance. This book is recommended for the general reader on the score of its general soundness, excellence of organization, original features, and extremely readable style. A wide diffusion of the knowledge it contains could be of great benefit to individuals and to society.

EDWARD C. COLIN

Department of Science
Chicago Teachers College

Economic Aspects of Atomic Power. Sam H. Schurr and Jacob Marschak. Princeton, N. J.: Princeton Univ. Press, 1950. (For the Cowles Commission for Research in Economics.) 289 pp. $6.00.

Marschak and Schurr and six collaborators have presented an exploratory study of the possible economic effects of peacetime atomic power. It is a scholarly, well-organized and wide-ranging study, without sensational conclusions. The authors emphasize that it is an exploratory and, therefore, tentative study for two reasons: technological data on atomic power are largely not available (nor existent), and the economic theory of the total economic effect of invention is complicated and imperfect. Nevertheless, this essentially conservative book provides the first serious and well-rounded orientation toward the unseen atomic future and is recommended to those who would have a part in this future.

The book is divided into three major parts. The first, consisting of two chapters, deals with the probable cost and other economic characteristics of atomic power compared with our more conventional energy sources. In Chapter 1 the authors choose a range of costs in which they believe atomic power may fall and examine the other economic characteristics, mainly that stemming from the ready transportability of atomic fuel. In Chapter 2 they present a very useful collection of data on the present characteristics of conventional power that serves to remind us that not all of the future is atomic. A particularly interesting map of the world water-power resources indicates the enormous supply of solar energy in this convenient form but in rather inconvenient location (western and central Africa being particularly notable). This section essentially sets up the question: What would the economic effect be if a power source falling within this range of costs and independent of location were available? The bulk of the book attempts to answer this question. In spite of this larger purpose, most of the initial skirmishing has dealt with the relatively less important, and as yet unanswered, question of the cost of atomic power.

Part Two, examining the detail of the possible economic effect of the new invention, is full of substance and interest. The industries examined include aluminum, chlorine and caustic soda, phosphate fertilizers, cement, brick, flat glass, iron and steel, railroad transportation, and residential heating. Of these, it seems to the reviewer, aluminum, iron, and steel were most significantly affected. For aluminum, the effect might operate on the future locational pattern of the industry rather than on its costs. For iron and steel, the electric smelting branch of the industry might be fostered, and, on a very long chance, the present blast furnace reduction methods might be modified. A great deal of valuable information on operating costs is contained in these 10 chapters. Unfortunately, some of these operation costs have become rather outdated in our recent and violent price changes. In some cases, one could have wished that a fuller treatment of capital costs, to augment the consideration of operating costs, might have been presented. Capital costs per unit of product can influence industrial decisions today quite as strongly as operating costs.

Part Three is a first-order attempt to describe the total economic effect on nations and regions of such a power source including the "sequence of complicated repercussions of one economic sector upon another." Only a "sketch" of this large and difficult problem is claimed by the authors. In comparison with the excellent exposition of the larger parts of the text, this short part deserved a bit more editing.

The whole book represents a reasoned study and,

more than that, an outline for even more work on atomic power and its economic effects. The reader will find that it presents a first picture of the potential usefulness of this aspect of the nuclear engineer's work. No book of equal stature on the subject has yet appeared.

JOHN R. MENKE
Nuclear Development Associates, Inc.
White Plains, New York

The James River Basin: Past, Present and Future. Compiled by the James River Project Committee, Virginia Academy of Science, 1950. 843 pp. Order through Foley F. Smith, Box 1395, Richmond 11, Va. $6.00.

The concept of surveying natural resources within physiographic rather than political boundaries has been aptly exploited by the James River Project Committee. The results are highly satisfactory; in fact, the completeness and generally high caliber of the coverage of each division leave little to be desired. Considering the immense difficulties of consummating the survey, it can boast of few competitors in the United States.

The James River basin is a triangular area extending through the central part of the states from the West Virginia border to Norfolk and the mouth of the Chesapeake Bay. It drains important parts of all the Virginia physiographic subdivisions from mountains to tidewater. Most of the transportation systems, educational institutions, industrial centers, and important cities are found in the basin. Such regions, as a portion of the Dismal Swamp, Allegheny Mountains, fresh and tide waters, are still rich in natural resources despite the inroads of civilization that began in 1607. Prominent scientists, educators, and industrial and social leaders have participated in the compilation of the monograph. Specific chapters, or sections, have been the responsibility of one or two individuals, and their work is accurate and factual. Since the survey has been prepared for laymen and scientists alike, the style in general attempts to be popular, but much of the writing will require more than a cursory examination. The monograph is divided into five major subject headings: Conservation, Recreation, Education; Biological Sciences; Earth Sciences; Mathematical and Applied Sciences; and Industry and Transportation.

I. N. Gabrielson's essay on conservation points out that, in general, all the elements necessary to sound resources management are now present and active in the valley of the James. The recreational aspects of the river, surveyed by R. F. Nelson, are concerned with hunting and fishing, the George Washington National Forest, the Jefferson Forest development, and miscellaneous needs.

Over one third of the huge volume is devoted to the biological sciences. "Botany of the James River Basin," by A. B. Massey, and "Plant Pathology," by S. A. Wingard, are, of necessity, rather general, but are well summarized and have useful bibliographies. The entomological essay, by G. T. French, is devoted almost wholly to history and control of economic pests, with little reference to the actual rich insect fauna of the basin. In addition to the references cited in the text, a bibliography covering insect studies made in Virginia should have been added. The check list and bibliography of the 145 species and subspecies of mollusks, by P. R. Burch, is one of the worth-while contributions from the viewpoint of a zoologist.

E. C. Raney recorded more than 74 kinds of freshwater fishes from the James River system. His account is one of the better faunal presentations, with a distributional discussion and complete bibliography. It should prove useful not only to Virginians, but to ichthyologists elsewhere. The section on marine fishes and invertebrates of tidewater, by N. Marshall, covers their economic role and is, unfortunately, too general to be an adequate report on such an important subject. The herpetological section of R. P. Carroll lists the Virginian herpetologists and indigenous amphibians and reptiles. An interesting photographic reproduction of an albino pilot blacksnake is given. A scholarly history of Virginia ornithology with an exhaustive bibliography was prepared by J. J. Murray, and the mammals are well covered by C. O. Handley, Jr., and C. O. Handley, Sr. The survey of medical sciences by M. P. Rucker consists of abundant historical and bibliographic evidence that Virginia's role in American medical science has been outstanding.

The section on earth sciences is divided into: (1) Agriculture, by A. W. Drinkard, Jr.; (2) Forests and Forestry, by C. Jones and associates; (3) Geology, by Marcellus Stow, J. K. Roberts, and associates. The treatment of mathematical and applied sciences consists of essays on the history of astronomy, mathematics, chemistry, engineering, and related subjects, by distinguished scientists of Virginia universities. The section on highway engineering and transportation deals with the industry, and with highway, air, and railroad transportation, emphasizing the established commercial companies. Officials and industrial authorities from these companies have provided the necessary data for this section, often with interesting historical documentation and illustration.

One cannot help but feel that the committee has completed a prodigious task, and they will be admired and envied for their results for years to come. The volume represents "the initial phase of research on the James River basin;" hence we may expect continued studies from the group. Although in the various essays emphasis was to be placed on the *human habitat*, this is not entirely successful. The committee is to be commended, however, for allowing each author to use his own discretion in organizing and writing his paper. They deserve sympathy, on the other hand, when one considers the difficulties involved in arbitrarily selecting subjects to be included and deciding on the amount of space each was to receive. Admittedly, some subjects benefited at the expense of others, and a more uniform treatment of biological subjects would have definite advantages. It is easy to comprehend why such biological forms as algae, fungi, protozoans,